

A new, puzzling, American route of the Arctic Tern *Sterna paradisaea*, and its implications

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The most famous of migrations are surely those of the Arctic Tern, *Sterna paradisaea* Pontoppidan, from the Arctic to the Antarctic. It was once thought they had been slightly exaggerated (Murphy 1936); but in fact some or all of them are even longer than the necessary distance involved. In the north, recaptures of ringed birds confirmed that, in autumn, the eastern American populations fly east across the Atlantic before turning south (Austin 1928); and quite likely some of these birds re-cross it in the southern hemisphere! Similarly, Siberian populations cross an ocean to the east before turning south; this tern "is not found in southern Asia and in the Indian and western Pacific Oceans" (Alexander 1928).

Arctic Terns are (or were) similarly absent, normally, from vast areas in and around the Caribbean Sea (and northward, as noted by American Ornithologists' Union (A.O.U. 1957)). And though Alerstam (1990) still shows, speculatively, both spring and autumn migrations as being near the west coasts of México and Central America, these terns were still unrecorded from México (Friedmann *et al.* 1950), Belize (Russell 1964), Guatemala (Land 1970), Honduras (Monroe 1968), El Salvador (Dickey & van Rossem 1938; Thurber *et al.* 1987), Nicaragua, and Costa Rica (Slud 1964, Stiles & Skutch 1989). The record nearest Panamá was of one taken *c.* 200 km off the Pacific coast of Colombia, 4 October 1924 (Wetmore 1965: 453), still the only Colombian record (Hilty & Brown 1986). Nor is it reported elsewhere in South America north of southern Ecuador (Meyer de Schauensee 1966). The only Antillean record is for Cuba, 20 June 1950 (Garrido & García 1975)—a strange date for migration, but approached by some of the few recent specimen records in non-breeding parts of the eastern United States. (Bermuda records are for May and early June—Wingate 1973.)

By 1931 A.O.U. (following Austin 1928) had already given the southern limit of migrant Arctic Terns, in eastern North America, as Long Island, southern New York. Even here they are merely casual or accidental (Reilly & Parkes 1959, Bull 1964). On their absence in the eastern United States, see numerous local and state lists, some cited by Lee & Cardiff (1993). See also the maps in various elementary ornithology texts, starting with Wing (1956), and also in Storr (1958).

Inexplicably, the present official A.O.U. Check-list (1983), giving no references, reversed all this. Despite the all-but-complete absence of records anywhere in the region, it supposedly migrated "along the Atlantic coast from New England to Florida (and west along the Gulf coast to Texas)", Europe and Africa were omitted!

Yet even in New England it is virtually unknown away from breeding areas (Maine, Massachusetts). There was, in fact, no record

whatever for New Hampshire or Rhode Island. In Connecticut, though breeding in the past is possible, there are still no specimens and less than five accepted sight reports (F. C. Sibley *in litt.*).

Curiously, a very different tern ecologically, the tropical Sooty Tern *Sterna fuscata*, crosses the Atlantic similarly, at least in part: the young of at least one United States colony (Robertson 1969; map) spend their first two winters (or more) in West Africa. This and other trans-Atlantic migrations, as of Brant *Branta bernicla* (Dennis 1990) and Black-legged Kittiwake *Rissa tridactyla* (Godfrey 1966), were also omitted by A.O.U. (1983).

Identification

Other similar northern hemisphere *Sterna* are readily told from *paradisaea* by their longer tarsi. But field identification is difficult, even with the other terns present for direct comparison; see for example Cardiff & Dittmann (1991), Wendehorst (1930). Other in-hand differences do exist (Laybourne, in Burleigh 1973; Weber 1981, Conry & Webb 1982), but wear, staining, moult, age (once full-grown), sex, breeding cycles, lighting, postures, etc., do not affect the short tarsus. This is constant, not seasonally variable. So we have relied on it.

Despite such claims as that field identification of juvenile terns "is moderately easy in reasonable conditions" (Grant & Scott 1969), many terns have been misidentified even in museums. Thus Clapp *et al.* (1983) found "so few of the specimens we examined proved to be correctly identified . . . some species are so difficult to distinguish that nothing but a scientific specimen is entirely satisfactory for re-evaluation of an earlier record."

Even where Arctic Terns' passage, at times, is substantiated, caution is needed. Thus, off southern California, most of the few spring adults pass in mid-May to early June. "This late passage is in opposition to published reports of large concentrations close to the northern California coast in late April and early May (which we suspect to be in error)." In southern California "they are only rarely observed from shore, and we suspect that many sightings from shore are erroneous" (Garrett & Dunn 1981: 193).

Elsewhere reports of Arctic Terns, often identified by single characters such as bill colour, are questionable; see Alexander (1952), Goethe (1935), Steinbacher (1935) and Cardiff & Dittmann (1991), and various reports of hybrid *Sterna*. All pale, moderately small terns ever taken and preserved in the immense interior of North America—south of Northwest Territories and vicinity, east of the Rocky Mountain states, and west of southeastern Ontario, western New York, the Atlantic states and recently Louisiana—proved to be *forsteri* or *hirundo*. We particularly doubt a recent July report from Michigan (Payne 1983).

Arctic Terns in México

Lists and guides of Mexican birds commonly omit the Arctic Tern. But Dickerman & Phillips (1976) pointed out that it must surely occur

regularly. In adjacent California it is a "common to very common fall migrant and uncommon spring migrant on the open ocean. . . . strictly pelagic . . . rarely occurring within 8 km of shore. . . . has never been satisfactorily identified on shore" (Unitt 1984). Yet Baja California reports remain extremely few; all are sight reports, of at most two birds. Indeed Wilbur (1987) reported none south of Islas Los Coronados, right at the California border—overlooking the report from Isla Guadalupe (Jehl & Everett 1985).

Thus *S. paradisaea* apparently becomes increasingly pelagic south of California, presumably avoiding warmer inshore waters. This was not unexpected. It migrates largely at sea; those birds that migrate (in small part) overland are avoiding long, round-about journeys or unfavourable territory (Godfrey 1973).

On 23 May 1954, Dwain W. Warner and Phillips saw about 50 pale terns in Bahía de Banderas not far off Puerto Vallarta, Jalisco, where none had been seen in mid-May. On 25 May, Warner saw about 200 along the beach in the southern part of town, evidently mostly immatures. A bird collected from a rock above the beach proved to our surprise to be *paradisaea*; but it was evidently sick, having a large tumour on the right side of the abdomen. Its occurrence in Pacific México seemed accidental.

Jehl (1974) found pale terns "locally common off the coast of Michoacán on 3 April" but scarce elsewhere off Pacific Middle America. These he called *S. hirundo*; but "At sea most terns did not approach the ship closely and similar species could have been overlooked at a distance. The northward migration route of the Arctic Tern (*S. paradisaea*) is unknown. I made special efforts to look for white-bodied terns well offshore, but saw none". Fishermen also told Villaseñor of numerous groups of 200 or more terns *c.* 20–25 km off Michoacán in April and May.

The nearby Michoacán beaches were then unexplored during migrations. As soon as bird remnants were collected, problems arose. A second-from-outer primary (Maruata, 30 June 1979, A.R.P.) was identified by R. C. Laybourne as *Sterna dougalli*—unknown within thousands of km. But it was worn, and better evidence seemed important.

In September 1983, Villaseñor began a study of the birds of the beaches of Maruata, Colola, and El Farito, famous as being among the main breeding grounds of the sea turtle *Chelonia agassizii*. At Maruata he collected an outer primary, and much of the wing of a different tern, 11 February and 3 March 1984. These R. C. Laybourne identified as *S. hirundo*. But the outermost primary is very similar in *hirundo* and *paradisaea*; and S. L. Olson pointed out to Phillips that the attached humerus seemed small for *hirundo*. Still, *paradisaea* seemed highly unlikely; it was not supposed to migrate anywhere near Michoacán.

Villaseñor also collected full study skins of terns resting at night on the sand. In preparing the first five (taken 16 and 17 October 1983, and 23 October 1985) for the Universidad Michoacana de San Nicolás de Hidalgo, he noted discrepancies with descriptions of the expected

TABLE 1
Individuals of *Sterna* collected on Michoacán beaches

Date	Locality	Species	Specimen(s)	Tarsi (mm)	Fat
14 Feb 1980	Boca de Apiza, southwesternmost Michoacán	<i>hirundo</i>	2♂ im., 1♀ im. 1 [ad] sex?	20.9, 22.7, —, 19.5	Mostly general
18 Feb 1980	Punta San Telmo, southwesternmost Michoacán	<i>hirundo</i>	2♂ ad., 1♀ ad.	21.3, 21.4, 20.4	Mostly general
16 Oct 1983	Maruata	<i>paradisaea</i>	1♂ ad., 1♀ im.	15.9, 15.4	No
17 Oct 1983	Maruata	<i>paradisaea</i>	1♂ ad., 1♂ im.	15.9, 16.3	No
18 Oct 1986	Maruata	<i>paradisaea</i>	1♂ im., 1♀ im., 1 [im.] sex?, part of a wing	16.4, 14.9, 17.2	No
20 Oct 1986	El Farito	<i>paradisaea</i>	1 [im.] sex?	15.0	No
23 Oct 1985	Colola	<i>paradisaea</i>	1♂ im.	16.4	No
29 Dec 1982	Maruata	<i>hirundo</i>	1♀ ad.	20.1	Scarce
30 Dec 1982	Maruata	<i>hirundo</i>	1♀ im.	20.9	No

hirundo. Phillips, visiting in December 1985, found four of five terns examined to be *paradisaea*!

Villaseñor later collected and determined other Michoacán *paradisaea* (Table 1), comparing this identified material. This is clearly the predominant tern on the beaches in October (Villaseñor 1990, 1993). Almost all the specimens are juveniles, without fat reserves, as if after a long, hard flight.

Possible routes to Michoacán

Whence do these terns reach Michoacán, undetected? As shown above, it cannot be from the east or northeast. And to arrive over the sea from the west, they would have to turn rather sharply east (or even northeast, to land) after having migrated far south. More likely their route is at least partially over land, like the James Bay birds (Godfrey 1973).

A transcontinental flight south to Michoacán would seem to present greater difficulties than would shorter overland journeys more east- or westward; and few pale terns, except *forsteri*, are seen (at surface levels) in most of interior North America. These were almost automatically called *hirundo*, even by such an expert ornithologist as Burleigh (1972 vs. 1973); identification is difficult, and (supposedly) *paradisaea* and *dougalli* did not occur. (Early reports of *paradisaea*, as breeding in Wisconsin, had been discredited by Schorger, in editing Kumlien & Hollister 1951.) By 1966 Godfrey concluded, logically, that in Canada "postbreeding movements are to the Atlantic and Pacific oceans".

But re-study of collections in the late 1960s and 1970s by A. R. Phillips, R. C. Laybourne and others produced fall records of Arctic Terns from Arizona, Idaho, and Colorado (Monson & Russell 1975, Burleigh 1973, Conry & Webb 1982). In southeastern Washington they may now be regular (Weber 1981).

Thus (1) at least some do migrate south far away from the well-publicized routes. R. W. Dickerman informs us that there is now a record as far southeast as eastern New Mexico, and (2) it seems most unlikely that almost the only pale, slender-billed tern (aside from *forsteri*) ever taken in central-western México, west and northwest of Michoacán, should be of an accidental species. Rather, careful collecting is needed.

Can long overland flights be largely made at high elevations? This, plus local ornithologists' concentration on more "interesting", localized forms of land birds, might produce the supposed absence, or scarcity, of Arctic and Common Terns in the Rocky Mountain–Great Basin Region; and in any case, these resembled the more usual *forsteri*, and no tern was endemic. Major museums, too, sent collectors for local species and subspecies, not for widespread birds more easily available elsewhere. Thus it was the *collecting* of Arctic Terns that was accidental, not necessarily their presence.

It is thus uncertain that *paradisaea* is "casual or accidental" in the inland west (A.O.U. 1983, overlooking the Arizona and inland Washington records). Rather, we need more intensive, selective collecting in western México and along two possible routes to the north:

(a) Eastern California. Here all records are of adults, 22 May and 1 to 13 June. More doubtfully on this route were the terns in eastern Washington, 21 May 1957 (Franklin County) and 3 August 1978 (on the Idaho border; not 1987, as in Stephens & Sturts 1991), recorded by Weber (1981).

The Gulf of California remains enigmatic. Collecting well offshore in season would probably rectify the present absence of records. Monson & Phillips (1981) repeated that both Arizona specimens were taken after storms in the Gulf; but were they not possibly precipitated from the western part of the inland route?

(b) East of the above regions, records (except as above) are from 4 and 8 September to 6 October—somewhat later than the main passage off California. (The report from Colorado on 9 July [Cooke 1897] is improbable.) The apparent convergence of these inland birds later on Michoacán may be due to the lack of collecting in other parts of México.

The insufficiency of reliable data

Demarcation of this inland route, and/or of one via central-western México, might be possible if numbers of terns could be marked in central northern Canada, preferably with small radio-transmitters. But this we cannot expect. Still, evidence (positive or negative) might be obtained by more intensive searching and collecting west and northwest of Michoacán, if barriers to knowledge were removed. At least scientists should be free to collect and transport remnants from beaches. If learning were untrammelled, and birders took a more serious interest in distributions and migrations, Weber's suggestion (1981: 163) that "perhaps *paradisaea* is a more frequent migrant . . .

than previously known" might prove true far beyond eastern Washington, etc.

The lessons of recent discoveries

The scanty evidence yet available points to an overland route to southwestern México. This would be different indeed (both geographically and ecologically) from all portrayals of the world's most famous bird migrations. Once more, universally accepted, oft-repeated knowledge is not necessarily complete—even on the distributions and migrations of common, conspicuous diurnal birds.

The case is hardly unique. Thus overland flights of some oceanic gulls "via the interior of North America" to southeastern California and the Gulf of California were suggested by Devillers *et al.* (1971: 25), and when attention was focused on other diurnal, usually common, American birds in collections, other surprises surfaced.

(1) In *Catharacta* skuas, the facts in the North Pacific had been almost completely reversed, and there was some confusion elsewhere (Devillers 1977). All northeast Pacific birds had been reported as some race of *C. skua*, or (A.O.U. 1931) as *C. chilensis*. All the other southern forms were restricted by Hellmayr & Conover (1948b) to the far south, wintering north no farther than Brazil.

Devillers (1977) re-identified all these western United States birds as the Antarctic *C. maccormicki*, "an uncommon but regular fall visitor to both California and Washington" with one specimen from Greenland, where a second was reported by Parmelee *et al.* (1977) (but their "Baja California" report actually refers to a ring found in the sand in northwestern Sonora [El Golfo de Santa Clara], *fide* the finder, Jack Strauss, *in litt.* to A.R.P.).

Devillers also called *C. chilensis* a species, and had dubious reports north to southern México (Oaxaca) in the Pacific. Some specimens were somewhat doubtful; and hybridization of *maccormicki* and "*C. lonnbergi*" is reported (Trivelpiece & Volkman 1980, Abstract no. 45, 98th Stated Meeting A.O.U.).

(2) Because spring migrant and juvenile Semipalmated Sandpipers *Calidris (Ereunetes) pusilla* are abundant in the eastern United States, it was generally assumed that similar sized 'peeps' in nondescript winter plumage were also *pusilla*. By 1931 A.O.U. had it wintering north to South Carolina, to which it added (1957) the coast of the Gulf of México. It was on birders' lists each winter, and was seen by the hundreds or thousands on Christmas Bird Counts. Peterson's classic Field Guide (1947) called it "The commonest of the 'peep' in the East", presumably at all seasons. (The similar Western Sandpiper *C. (E.) mauri* "is a sticker, hard to identify".)

But *pusilla*'s true winter range (Phillips 1975b) is mainly in South America, north barely to southern México and southern Florida. It is actually *mauri* that winters farther north.

(3) For the North American race of Cinnamon Teal *Anas cyanoptera septentrionalis*, A.O.U. exaggerated the winter range southward. Again, when two species are hardly distinguishable, birds are assumed

to be of the species common at another season when males, at least, are distinctive. But Nature is not so simple.

Ducks are less often preserved as specimens than waders. But we must note that Cinnamon Teal specimens are unreported between México and Colombia, except perhaps an old Panamá record without details. An old record from Costa Rica is probably an error (Slud 1964); recent sight reports (Stiles & Skutch 1989) may not be of wild *septentrionalium*, and would be casual at best. Modern Panamá records are band recoveries (a sight report by N. G. Smith; but see Smith 1991, Snell 1991). Monroe's (1968) several reports from Caribbean Honduras are quite unlikely, and one has already been questioned; see Phillips 1975c: 70–71. (This teal is unreported from Yucatán Peninsula; Paynter 1955.)

Perhaps this exaggeration was based on ringing returns; *A. cyanoptera* was not credited to Guatemala by either Griscom (1932) or Saunders (1950).

Hellmayr & Conover (1948a) gave its normal winter range as south to Michoacán and Veracruz, México; "probably sparingly ... to Colombia and perhaps Ecuador". Presumably they were influenced by F. C. Lincoln's report of one ringed in Oregon and taken in Magdalena, Colombia. Later summaries were less circumspect. A.O.U. (1957) reported it to "Nicaragua, Costa Rica, Panamá (Canal Zone), and northern Colombia (from the Cauca Valley to Santa Marta); possibly to Ecuador". Johnsgard (in Mayr & Cottrell 1979) repeated this: "to northern Colombia; casual east and south". A.O.U. (1983) even described it as wintering south to northern Ecuador.

But in parts of the western United States, where Cinnamon Teal are common, most of them migrate south early (at least where carefully studied, in Arizona; Phillips *et al.* 1964). A flight of the scarcer Blue-winged Teal *A. discors* then moves in. These nondescript basic-(winter-)plumaged teal are ringed as the common (in spring) *cyanoptera*; and the U.S.A. Bird Banding Office so reports them, wherever recaptured. No one ever critically examines or preserves the supposedly extralimital birds (Phillips 1975c: 71; still officially ignored, as above).

(4) The extinction of the once common "old northeastern Red Crossbill" *Loxia curvirostra neogaea* was overlooked due to confusion with other races that periodically invade its former range (and at times even breed there). See Phillips (1975a) and Dickerman (1986, 1987).

(5) Gulls (*Larus*) in well-studied museums and identified by authorities also prove unreliable. Devillers *et al.* (1971) re-examined 16 "Glaucous Gulls" (*L. hyperboreus*) confirmed in a special study by Johnston (1955); six proved to be misidentified, including three of the four California birds in the University of California Museum of Vertebrate Zoology. Another California gull, called *hyperboreus* by Grinnell & Miller (1944), had previously been called an Iceland Gull *L. leucopterus* (= *glaucoides*) by no less an authority than Dwight, and was indeed too small for *hyperboreus*; but it was actually neither of these forms.

Devillers *et al.* (1971) also found that Thayer's Gull *L. glaucoides* [?] *thayeri* "has only recently begun to be recognized, but winters regularly in sizeable numbers along the coast", etc.

Thus carefully studied, officially recognized scientific 'knowledge' is not immutable (and recent changes are not necessarily in the direction of accuracy, as shown by comparing older to 1983 A.O.U. Check-lists). For Nature's truths we must remain alert. The day of the collector has *not* passed, for those who value accuracy; see also Winker *et al.* (1991).

Had collecting (and museum studies) ceased by 1965, we would still think Arctic Terns accidental anywhere between California and Ecuador, or between the Pacific and New England coasts. (And all Hawaiian *S. sumatrana*, reported by outstanding ornithologists, proved to be immature *hirundo*; Clapp *et al.* 1983.) What we need, for unforeseen problems, is better collecting, with full data.

Preserving biodiversity requires, in a few cases, regular collecting and careful comparison (see *Loxia* above), to understand problems. If this seems paradoxical, remember the facts: very few small birds survive and nest successfully (even in undisturbed habitats) more than a few years at most. We cannot confer immortality (outside of a museum collection) on short-lived, doomed individuals; but facing problems with open eyes and minds, we can work to save *populations*. This should be our aim.

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